

COMMITTEE VI

The Universe and Its Origins:
From Ancient Myth to Present Reality
and Fantasy

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HOW GOOD WERE VELIKOVSKY'S
SPACE AND PLANETARY SCIENCE
PREDICTIONS, REALLY?

by

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With a quarter century of hindsight, we can approach the question of the alleged accuracy of Velikovsky's predictions about space and planetary science. The development and evolution of this claim may provide some insight into the mentality and techniques of argumentation used by Velikovsky, his supporters, and his detractors.

As expounded in a series of books, lectures, and short articles, Velikovsky had created an intricate ballet of celestial encounters which repeatedly devastated the Earth (he preferred to call his works a "reconstruction" rather than a "theory"). Venus was one of the key planets, having sprung from Jupiter during a close encounter with an errant Saturn. The newborn world was enveloped in gases and appeared as a comet, swinging deep into the inner solar system periodically. After a few hundred or a few thousand years, Earth's luck ran out; and it nearly collided with comet-Venus. The resulting series of disasters and subsequent near-collisions form the causes of the parting of the Red Sea, the plagues of Egypt, the fall of the walls of Jericho, and the "sun standing still" over Gibeon...such is the "reconstruction" of Velikovsky. Venus, meanwhile,

knocked Mars off course while itself settling into a more peaceable orbit; the Red Planet, in turn, made a series of equally devastating visitations seven centuries later.

And all of this constituted only the final act in a drama which Velikovsky envisaged went back thousands of years. Earlier, he wrote, Mercury, too, had been involved in planetary encounters; Jupiter and Saturn had been double planets, and Earth had been a satellite of one of them; Saturn had exploded, showering Earth with the waters of the Deluge; the Moon had come in from somewhere and had been captured somehow by the Earth. All of this was supposed to have occurred "within the memory of man".

As the years passed, Velikovsky claimed a series of important "successful predictions" about the Solar System, based on his world views: The space age gave my views a record of confirmations," he wrote in 1977. Earlier, one of his chief disciplines was even more specific: "Seldom in the history of science have so many diverse anticipations -- the natural fallout from a single central idea -- been so quickly substantiated by independent investigation" wrote Ralph Juergens in September 1963. Velikovsky himself treated his theories as 'proven', even while he remained a scientific pariah, when he asserted in 1974 that

"My work today is no longer heretical. Most of it is incorporated in textbooks, and it does not matter whether credit is properly assigned...None of my critics can erase the magnetosphere, nobody can stop the noises of Jupiter, nobody can cool off Venus, and nobody can change a single sentence in my books."

This attitude is all the more baffling in light of the claims made by Velikovsky's detractors, most notably Carl Sagan. In reply to the assertion that space exploration had verified Velikovsky's theories, Sagan told a San Francisco seminar in 1974 that "To the best of my knowledge, there is not a single astronomical prediction correctly made in Worlds in Collision with sufficient precision for it to be more than a vague lucky guess and there are...a host of claims made which are demonstrably false." This view was elaborated by NASA space scientist David Morrison in a newsletter debate published in 1979. Wrote Morrison, "Every important prediction he made in 1950 concerning conditions on the planets, such as hydrocarbon clouds on Venus, large amounts of argon in the atmosphere of Mars, recent melting of the lunar surface, large internal heat sources on Venus and perhaps Mars, large-scale recent cratering of Earth and Moon, and synchronized planet-wide

volcanism on Earth have been shown decisively to be in error....Every new space mission, such as the recent Pioneer-Venus probes, pounds another nail in the coffin...The cruel truth is not only that astronomical evidence fails to support Velikovsky, but that a great deal that seemed plausible or at least possible when suggested in 1950 has been shown to be incorrect."

It is an interesting exercise to summarize the planetary predictions he made -- and later remade in light of what was actually discovered -- and compare them to actual space data. Such an effort should restrict itself to such physical measurements and avoid all questions of terrestrial ancient history (which Velikovsky sought to revise chronologically by many hundreds of years) and of interplanetary dynamics (where Velikovsky has called the actions of immense non-gravitational forces). Instead, by concentrating on the alleged "confirmation" of his planetary predictions, we may now with hindsight be able to determine if his "hits" were significant proofs, coincidences, lucky guesses, or merely Monday-morning-quarterback revisions of originally ambiguous handwaving which could be interpreted ex post facto to mean anything (the "Nostradamus Effect").

One of the cornerstones of the edifice of the claimed "successful predictions" of Velikovsky is

the heat of Venus. When he wrote Worlds in Collision in 1950, the scientific world considered Venus to have surface temperatures only slightly higher than Earth. Yet space probes later found that the temperatures exceeded 800 degrees Fahrenheit, a figure which seemed to bear out Velikovsky's claim that the newborn planet had at one time been "candescent", or glowing, with excess heat. Later efforts by astronomers to account for the high temperatures by means of a "runaway greenhouse effect" were denounced by Velikovsky as clumsy groping -- "completely unsupportable" he called it in 1974, adding that such an idea was "in violation of the Second Law of Thermodynamics".

Actually, the heart of Velikovsky's prediction was that Venus would be giving off more heat than it received from the sun, and that it would still be cooling off. Space probes and recent terrestrial measurements have both provided voluminous evidence against these claims, and the Pioneer-Venus data in 1978 showed that the "runaway greenhouse effect" is still very much in the running. One problem with this "effect" is that it depends on trace atmospheric constituents for thermal contributions all out of proportion to their actual mass; so there is still room for doubt.

Velikovsky also claimed that "the presence of hydrocarbon gases and dust in the cloud envelope of Venus would constitute a crucial test...." and further that "on the basis of this research, I assume that Venus must be rich in petroleum gases." Neither of these predictions have been borne out by data from American and Russian atmospheric probes. Velikovsky also had suggested that "microbial life able to catalyze can possibly be found in Venus' clouds...", an unlikely development. The surface of Venus will be very plastic, he predicted, with "mountain-high ground tides" -- whose absence was established by the radar scans from the Pioneer-Venus Orbiter in 1979 which located solid continents and mountain ranges. He claimed to have predicted the massive atmosphere of Venus, but no records have been found which show that he did so until after it was discovered. Lastly, he claimed that Venus would have "a weak magnetic field", an ambiguous stab that comes up against Pioneer-Venus determinations that there is no detectable intrinsic Venusian magnetic field at all (magnetic fields are induced by the Solar Wind, which Velikovsky did not predict).

Another voice in the Venus prediction controversy was also raised in mid-1980 when Kendrick Frazier, former editor of the weekly Science News and now editor of the quarterly

Skeptical Inquiry, wrote an analysis of Velikovsky's claims versus recent discoveries about Venus. His article, The Distortions Continue, was based on extensive interviews with scientists involved with the Pioneer-Venus probes which reached that planet in December 1978, using as a discussion point an advertisement from Velikovsky's publishes which claimed that recent space discoveries had verified many of Velikovsky's predictions.

The scientists' reaction was blunt. "The ad is thoroughly dishonest," wrote one; "The ad, like the book it is promoting, contains more falsehoods in a paragraph than one can refute in a chapter." Dr. David Morrison of the University of Hawaii, a frequent Velikovsky critic, was even more direct: "Several of the statements in the ad are outright lies. I am used to distortions by the Velikovsky supporters, but this ad seems to be particularly reprehensible." Another astronomer put the dispute in perspective, "The Velikovsky hypothesis was never controversial among scientist," wrote George Abell. "It is, and was recognized at once as, a crank idea."

The Earth's Moon played a significant role in Velikovsky's scenarios of planetary encounters. Most prominent among the successful predictions by

Velikovsky are the existence of "numerous moonquakes" and of "lunar remanent magnetism", both made in the face of the expectations (or lack of them) of 'establishment science'.

This is what Velikovsky wrote about the possibility of moonquakes, using the July 21, 1969 issue of the New York Times as a forum: "I also maintain that moonquakes must be so numerous that there is a bit of chance that during their few hours on the moon, the astronauts may experience a quake." The astronauts, of course, did not 'experience' (i.e., 'feel') a moonquake, nor did any subsequent astronauts -- nor would they if they had stayed for millions of years. As it turns out, moonquakes are very weak and very rare; and it is only because of the extreme sensitivity of Apollo instruments and because of the high seismic conductivity of the super-dry lunar surface that the very tiny moonquakes which occurred there were recorded. But at every comparable level of intensity, the Moon is a much, much quieter place than is Earth. Velikovsky's description of the Moon and of the astronauts' chances of encountering moonquakes were both in error -- although a few years later, his followers were making it sound as if he had been right on target: "He said only that quakes would be numerous," wrote Dr. C. J. Ransom in 1975, "and did not suggest that they would be of

great magnitude." A skeptic is justified in wondering that if this is the case, how did Velikovsky expect the astronauts (not their instruments) to "experience" them?

The Velikovsky school refused to concede the point. Wrote Lewis Greenberg, editor of Kronos: "With respect to moonquakes, Oberg should consult the October 1971 issue of Chemistry. There, he will find a NASA report of 11/20/70 to the effect that equipment left on the Moon by Apollo XII recorded an average of one lunar quake a day, with more severe quakes occurring once a month. This hardly sounds 'rare'...."

But, it also remains true that these moonquakes are both tiny and rare. I quote from Elbert King's Space Geology (1976): "...The Moon is virtually aseismic compared with the Earth. If it were not for the extremely low seismic noise of the Moon, and good sensitivity of the landed seismometers, the Moon would appear to be very dead indeed." Compare this with Velikovsky's predictions and the subsequent rationalizations of his proponents.

As to the magnetism in the rocks (which to Velikovsky's credit seems to have been a complete surprise to everybody else), his exact words were that the Moon's surface "could conceivably be rich

in remanent magnetism resulting from strong currents when in the embrace of exogenous magnetic fields." Such a careful wording would have been safe if such magnetism had not been found, but Velikovsky hit the jackpot here. Or did he?

The actual nature of the lunar remanent magnetism is even stranger than Velikovsky had predicted. Far from being a planet-wide field, it is locally "patchy" and varies tremendously in orientation and strength. In fact, the fossil magnetic fields appear related to random impact events, not to the simultaneous imprinting of a unidirectional outside field. The lack of any general homogeneity has led moon geologists to reject the notion of any exterior cause such as the one Velikovsky predicted.

Nor is the timing in agreement. Velikovsky wrote: "I maintain that less than 3,000 years ago the Moon's surface was repeatedly molten and its surface bubbled," causing most lunar craters (the others were supposedly created by interplanetary lightning discharges which also created the rilles). All radioactive dating schemes indicate that the last melting took place billions of years ago, but Velikovsky has found fault with them. Additionally, Velikovsky warned in 1967 of danger to the lives of astronauts: He claimed to have identified a special condition the astronauts most

certainly will meet on the moon that may...endanger the lives of the astronauts even if they succeed in returning...." This condition was that "radio-activity must still be present on the surface of the moon...far exceeding any exposure regarded as safe." Especially near the rayed craters, he forecast "a strong, decidedly harmful, radioactivity." But it wasn't there: Apollo instruments measured no radioactivity more intense than that from terrestrial basalt -- and certainly nothing anywhere near the danger level.

Astronomy magazine provided a forum for this debate in 1980-81. Responding to my initial anti-Velikovsky sentiments, Leroy Ellenberger wrote (in part): "Oberg states, for example: 'Radioactive dating (of lunar samples) indicates that the last melting took place billions of years ago....' But radioisotope dating determines age, not thermal history. Regarding the time since the last melting, Velikovsky replied, in response to an earlier critic, 'The question is not when the rocks have been formed or for the first time crystallized; but when they were heated and partly molten for the last time.' Velikovsky then went on to cite the thermoluminescence study on Apollo-12 cores, which indicated thermal disturbances in historical times."

This is a standard Velikovskian attempt to invalidate all radioactive dating results. But in citing allegedly supportive "thermoluminescence data", Ellenberger was walking into a prepared minefield. I zipped my response back off to Astronomy: "radioactive dating does determine the age of rocks since last melting. Melting the rocks releases trapped argon atoms which make radioactive decay dating possible."

And I pointed out that the citation of "Apollo-12 thermoluminescence data" (which they claim invalidates these radioactive dating techniques by indicating thermal disturbances within historical times) is simply fallacious. According to Dr. Robert M. Walker, the man who did the original studies, "The discussion of the thermoluminescence data by Velikovsky is completely wrong-headed...Any disturbance we might have reported would have been a physical disturbance resulting in the exposure of sub-surface material to solar heating. In fact, the thermoluminescence data prove that Velikovsky's contention -- that the Moon surface was recently heated -- is nonsense." These are the words of the principal investigator of the experiment, whose report is used by Velikovsky as support.

Regarding the actual composition of the lunar surface, Velikovsky was quite specific. In a

letter to the National Academy of Sciences on July 2, 1969, he claimed that moon rocks "will be found rich in oxygen, chlorine, sulfur, and iron." Actually, iron was found to be present at or slightly below the average "solar abundance", and both chlorine and sulfur were depleted by several orders of magnitude. Oxygen, while present in great absolute amounts, was far from rich in terms of solar system averages. In fact, since iron was found to exist primarily in the ferric rather than ferrous (or more highly oxidized) forms, it was possible for geologists to demonstrate that lunar rocks were formed in the presence of amounts of oxygen many orders of magnitude less than on Earth. Velikovsky also predicted that "carbides, into which hydrocarbons would transform when heated, [will be found] in substantial quantities"...and they were not. Additionally, he had said that "the Moon may well have hydrocarbons in the form of dried naphtha, bituminous rocks, asphalt, or waxes." And again his prediction was wrong.

"In my understanding," Velikovsky wrote in the New York Times during the Apollo-11 landing, "...less than 10,000 years ago, together with the earth, the moon went through a cosmic cloud of water (the Deluge) and subsequently was covered for several centuries by water...." yet moonrocks show

no trace of such oceans or even a light dew. According to Velikovsky, the Moon was captured by the Earth, but he departs from other theorists by claiming that this capture occurred in the recent past: "It is probably the most remote remembrance of mankind: the time when there was no moon...The traditions of diverse people offer corroborative testimony to the effect that in a very early age, but still in the memory of mankind, no moon accompanied the earth." That claim, too, has been inconsistent with all relevant space probe data.

The planet Mars played an important role in Velikovsky's reconstruction of ancient history, since it was supposed to have been the agency responsible for a series of worldwide catastrophes in the eight and seventh centuries B.C. Since Velikovsky expected the planet to have suffered equally or moreso in the exchange, he assumed it would be covered with fractures -- and that would be the explanation for the reported "canals". And so he reported in 1974: "The 'canali' proved to be...rifts caused by twisting of strata." But they weren't -- the classical canals were only optical illusions. However, there were valleys and chasms on Mars; and, however, mysterious their origin remains, they do not appear to be the result of "twisting of strata," at least not in the recent past. Missing, too, were the localized areas of

strong radioactivity which Velikovsky had prophesized.

"I claimed that neon and argon are chief constituents in the Martian atmosphere," he reminded scientists in 1969, pointing to a passage in Worlds in Collision which stated that "neon and argon will be found as main ingredients of the Martian atmosphere." When some highly confused readings from a Soviet Mars probe in 1973 hinted at argon compositions as high as thirty percent, Velikovsky saw himself once again vindicated. However, the celebration was premature, because Viking probes in 1976 determined that argon only made up one or two percent of the atmosphere -- far below Velikovsky's predictions.

Velikovsky's followers urgently sought rationalizations for this discrepancy. Writing in The Age of Velikovsky, physicist C. J. Ransom claimed that "it is not now known if this is the average percentage [of argon]...or if the Soviet measurements are correct and this is one of the depleted areas," a depletion allegedly caused by the selective concentration of argon in other regions (in other words, the argon was there, but it was hiding!). Writing in the pro-Velikovsky journal Kronos in 1977, editor-in-chief Lewis M. Greenberg made the excuse that "the relatively low

amount might be the result of an argon loss to the Earth, the Moon, and interplanetary space during the celestial events described in Worlds_in_Collision (in other words, the argon had been kidnapped!). Another leading pro-Velikovsky scholar, Ralph E. Juergens (who died a month before Velikovsky did), asserted that the phrase "in rich amounts" must be interpreted in relation to the Earth, where argon makes up about one percent of the atmosphere; thus, leading to the conclusion that Martian argon may be up to twice as plentiful in its relative concentration (in other words, Velikovsky had been right but his prediction had been misinterpreted by everyone including Velikovsky!). Despite all of this waffling, Velikovsky's prediction of "rich amounts" of argon in the Martian atmosphere is still widely trumpeted as yet another vindication of this theories.

A parallel maneuver was used with neon, since Velikovsky had predicted that Mars would have a "neon rich" atmosphere. In describing the Viking experiments, Velikovsky had criticized NASA for anticipating "in my opinion, too little -- 666 parts per million -- neon...The logic that led me to these conclusions was the same that made me make similar advance claims concerning the moon." When Viking landed, it found that the neon concentration was on the order of ten parts per million -- almost

a hundred times less than the figure which Velikovsky had forecast was "too little".

Viking had other surprises for Velikovsky. First (and it surprised everyone else too) was the red sky, despite Velikovsky's explicit prediction in Worlds_in_Collision that "the atmosphere of Mars is invisible...([and any Martians] see a black sky, not a blue one as we do." Regarding the possibility of biological activity, he had told an audience in 1974 that "...it is not excluded that Mars is richly populated by microorganisms pathogenic to man...I do not discount the probability that the seasonal changes in the color of the Martian surface may be due to seasonal microbial or other low vegetable activity." Although this is very weak for a "prediction", the pattern has emerged that any discovery of life would have been seen as confirmation of another prediction, while the failure to discover life would not disprove the "prediction".

The nature of the Martian polar caps also was the subject of some explicit predictions by Velikovsky: "Chances are that they are composed of the same organic molecules as the envelope of Venus," he wrote in 1963, clarifying his earlier prediction that they were carbohydrates ("probably in the nature of carbon," he had said, but not just

carbon dioxide. Mariner and Viking data took a long time to confirm that the caps contain water ice and frozen dioxide ("dry ice") but there is no evidence for heavier organic compounds.

Jupiter was the source of the birth of Venus and other comets, Velikovsky claimed, and the Red Spot was "an atmospheric effect related to the scar where Venus was ejected" (there is no surface to scar, and the Red Spot is now thought to be a highly stable hurricane which floats freely in the turbulent atmosphere). "Jupiter must have petroleum," Velikovsky predicted, and "there are some historical indications that Venus -- and therefore also Jupiter -- is populated by vermin. By 'vermin' Velikovsky presumably meant "flies," but all dictionaries extend that term to cover rats, mice, worms, and lice (although not, as Carl Sagan imagined, frogs) -- all extremely unlikely denizens of the atmosphere of Jupiter.

Velikovsky's followers are very proud of his prediction of radio noises from Jupiter -- which were there, much to the surprise of scientists. He made this prediction in a speech given at Princeton on October 14, 1953: "The planet Jupiter is cold, yet its gases are in motion. It appears probable to me that it sends out radio noises as do the sun and the stars." Not only was Velikovsky wrong about the temperature of Jupiter (everyone else

was, too), he accepted what turned out to be a mistaken idea that radio point sources in the sky were from stars -- they really were from galaxies, as was finally proved about ten years later. The radio noise which Velikovsky predicted, called "thermal" because it is the natural byproduct of any object warmer than absolute zero, exists on Jupiter and on other planets as well; but the characteristic radio noises from Jupiter are the decimetric (caused by electrons oscillating in the atmosphere) and the decametric (caused by electrical discharges in the upper atmosphere), and these are far more powerful than the thermal radio noises -- yet Velikovsky's prediction does not seem to point to them. At best, his "hit" is a glancing one here, and it certainly is not nearly as impressive as later accounts made it sound. (Supporters claim Velikovsky predicted more than just the "thermal" radio noises, and they have some good arguments here.)

Regarding Saturn, Velikovsky claimed that it had once been the largest planet in the Solar System and had constituted a double-planet with Jupiter; Saturn subsequently exploded, showering the Solar System with water which accounted for the Deluge on Earth. "It is conceivable," Velikovsky wrote, "that the Earth was, at that time, a

satellite of Saturn, afterwards possibly becoming a satellite of Jupiter." The Saturn shower brought Earth most of the components of seawater salt: "Chlorine may thus be of extraneous origin," Velikovsky hypothesized. "It could possibly be present in some different combination on Saturn." Also present on Saturn, according to a suggestion made by Velikovsky at NASA's Ames Research Center in August 1972, is "primitive planet life".

Mercury, too, is not ignored. Wrote C. J. Ransom: "Velikovsky believes that Mercury was involved in certain of the Earth's recent catastrophic events," based on some unpublished manuscripts he had seen. In public, Velikovsky denounced Einstein's Theory of Relativity as it has been applied to Mercury: "The precession of Mercury is not a relativistic phenomenon," he claimed in 1972, "but results from that planet's electrical charge and its motion in the Sun's magnetic field...Mercury has occupied its orbit only since recent times." Although the Mariner-10 probe made three close fly-by passes of Mercury without detecting any such perturbing force, Velikovsky had earlier suggested that our first moon probes had missed their targets because they had been thrown off course by the moon's electrostatic charge -- which conveniently vanished a few years later.

This record of prognostications, if it proves anything, demonstrates that Velikovsky's chief skill had been in making flexible enough predictions, and then in reinterpreting them skillfully in light of ultimate discoveries, in order to produce what superficially does appear to be a remarkable track record. "How could I produce this score of correct prognostications?" he asked in 1974, answering the rhetorical question with the circular assertion that he had been correct from the very beginning.

As we saw earlier, many space scientists have objected to this mode of creating "correct predictions", but Velikovsky would not submit to that type of criticism: "The most despicable of all ways of suppression is denying me the originality and correctness of my predictions," he told a conference at Notre Dame in 1974. Regarding the continuing criticism which his theories had received, he also claimed that "the sons have exerted themselves to outdo their fathers...The scientific community...neglected its debt to the public, to truth, and to its own conscience." Echoing that theme, the pro-Velikovskian Italian mathematician de Finetti called the anti-Velikovsky forces a "despotic and irresponsible Mafia". Their criticisms, wrote the pro-Velikovsky journal Pensee in

1972, were "chiefly remarkable for dishonesty and incompetence." The level of debate on this issue, obviously, has not been conducive to rationalism and dispassionate consideration of the evidence!

In addition, Velikovsky's predictions did not meet the test of scientific validity because they were not formulated so as to be disprovable. Instead, phrases such as "could conceivably exist" or "not rule out the probability" were injected into the forecasts, thus allowing nearly any eventuality to be considered either confirmation or null. Some specific predictions were made, and these usually turned out completely wrong -- which is why they are not referenced in the pro-Velikovsky literature.

The record of Velikovsky's predictions about space and planetary science therefore provides a sound criterion for judging the validity of both his theories and his method. Both fail.

*****JEO*****